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ABSTRACT

The purpose of this study was to examine the factor structure that underlies students' perceptions of intellectual progress and personal growth and to suggest additional ways of using survey information. The study was based on a sample of 68,650 students who completed the American College Testing College Outcomes between 1999 and 2001. From the Progress scale of 26 items, researchers identified four factors: General Education and Skills; Critical Thinking; Science, Mathematics, and Technology; and Career Preparation. From the Growth scale of 36 items, four other factors were identified: Academic and Whole Person Skills; Social Interaction Skills, Political and Societal Awareness; and Personal and Spiritual Values. These two sets of factors were similar across institution type, especially with regard to items in each factor that had the highest factor loadings. In addition, factor means were computed for each institutional type so that colleges can compare their results with those of similar institutions. (Contains 12 tables and 22 references.) (Author/SLD)

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The Factor Structure Underlying Perceived College Outcomes

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Abstract

The Factor Structure Underlying Perceived College Outcomes

The purpose of this study was to examine the factor structure that underlies students' perceptions of intellectual progress and personal growth and to suggest additional ways of using survey information. The study was based on a sample of 68,650 students who completed the ACT *College Outcomes* in between 1999 and 2001. From the Progress scale of 26 items, we identified four factors: *General Education and Skills*; *Critical Thinking*; *Science, Mathematics, and Technology*; and *Career Preparation*. From the Growth scale of 36 items, we identified four other factors: *Academic and Whole Person Skills*, *Social Interaction Skills*, *Political and Societal Awareness*, and *Personal and Spiritual Values*. These two sets of factors were similar across institution type, especially with regard to items in each factor that had the highest factor loadings. In addition, we computed factor means for each institutional type so that colleges can compare their results with those of similar institutions.

The Factor Structure Underlying Perceived College Outcomes

Higher education's evaluation and review teams, accreditation agencies, policy makers and governing boards have in common interest in assessing college outcomes. Education finance experts want to know if expenditures and investments are worthwhile. College administrators sometimes need ready answers to questions about how students feel about aspects of their college experience. A systematic way to assess the student pulse and report it in a meaningful way is for some, imperative. As one provost from a private university put it, "Sometimes I have to produce quick answers to questions about how our students are doing, and when I need answers, I need them now" (W. L. Lester, personal communication, June 1999).

Changes in technology and in world affairs require new perspectives and directions for colleges to consider as they monitor student growth and progress. Students now want to know about aspects of the institution that relate to quality; in this era of the internet and other technologies they are able to learn a great deal about the quality of education at an institution. Students have the option of searching for institutions that appear to offer quality instruction and cost-effective education.

Administrators and policy makers also need to know about quality and cost-effective education. They have urgent and often unexpected needs to know about programs in order to allocate and reallocate existing resources, provide evidence of the need to continue or discontinue support for given areas, and plan for maximum effectiveness in all programs. Ewell (1985) states that student outcome results can "be used to improve retention and recruitment strategies, to identify problems within particular programs or curricula, or to establish the need for increasing the emphasis on particular skills areas across the curriculum" (p. 2). By providing insight into students' perceptions of their college experience, feedback from surveys help institutions address planning needs, inform policy makers and curriculum planners, triangulate in depth to improve student programs and services, and provide regional and professional accrediting bodies with documentation of program effectiveness.

The survey process may also benefit students. Students make progress intellectually and experience personal growth as college years pass, but some may be more aware of their growth than others. Some students may have higher levels of consciousness of their progress than others. Their experiences differ, their knowledge bases differ, and their motivations differ. Using surveys to assess student perceptions of progress and growth may help students develop greater awareness of how college can assist their development—their progress and growth. This form of self-assessment may prompt students to become more aware of their progress and growth during college.

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When national user norms are available, an institution can compare its survey results to results from comparable institutions. One survey instrument that colleges and universities use to collect students' perceptions of their college experience is the ACT *College Outcomes Survey* (COS) (ACT, 1988). ACT designed the COS to produce information at the item level, permitting schools to use the data in a variety of ways. Factor analysis conveniently reduces the items to a smaller number of concepts or constructs with a common underlying theme. When factors perform well, institutions will have the option of using factor means to compare groups of students.

The purpose of this study was to examine the factor structure that underlies students' perceptions of intellectual progress and personal growth and to suggest additional ways of using survey information. Items from several sections of the COS, when factor analyzed to identify underlying student responses, can enable users to summarize and interpret group differences relative to a limited set of *constructs* rather than to many individual items. We factor analyzed college outcomes items in two areas—perceptions of progress with cognitive skills and perceptions of personal growth.

Each of the two COS sections selected for this study contain items that provide stand-alone measures of college outcomes and are used as such by colleges and universities throughout the country. With items identified with factors by institution type (public & private, 2-year and 4-year, large and small, and the network of colleges), users can compare their own students' responses to those of comparable institutions and do so by using factor means.

Methods

Data for the Study

Existing data for this study were retrieved from the most recent national user norms files for colleges and universities that had administered the ACT COS during the three-year period prior to January 2002. The sample for the national user norms—and for this study—consisted of 68,650 (of approximately 75,000) student records. For the norms, this number was arrived at after some records were eliminated to guarantee that no individual, institution, or system was over-represented. This sample included technical and 2-year colleges (33%), bachelor's degree granting institutions (17%), master's degree granting institutions (32%), and institutions granting doctorate or equivalent degrees (19%). Of the 68,650 records in the sample, 73% were from public and 27% were from private colleges; 67% were from 4-year and 33% were from 2-year colleges; and 56% were from small and 44% were from large colleges. About 10% of the 68,650 records were from a network of 23 colleges. In all, the sample included students from 89 public and 41 private colleges located in 38 US states and consisted of 63% females and 37% males. All but about 7% of the total group aspired to a lifetime goal of a bachelor's degree or higher—bachelor's (25%), master's (47%), and doctorate or equivalent (21%).

Instrument

The COS was designed to collect student perceptions of aspects of the college experience and the institution after the student has been exposed to the college environment for a reasonable period of time. The outcome statements on the instrument are broad enough in scope to be applicable to most postsecondary institutions, yet specific enough to provide data that can be translated into institutional action. Section II of the COS includes two dual-scaled sub-sections, part A and part D, each of which has spaces at the left and at the right to collect student responses. We limited this study to data from only one of the two scales in each section, the one to the right of the 26 items in Section IIA and the one to the left of the 36 items in Section IID. When we refer to the *Progress* study, we are referring to results from the scale on the right side of Section IIA that focuses on *progress made at this college* in cognitive skills and intellectual growth. When we refer to the *Growth* study, we are referring to the scale on the left side of Section IID that focuses on *personal growth since entering this college*. For background information on students, we used items from Section I, Background Information, and from a form submitted by institutions when they mail the surveys to ACT for scoring, analysis, and reporting.

Procedures and Definitions

We used frequencies and percentages to describe colleges and students in the sample. We performed factor analyses on these two sections of the survey to observe underlying factor structures. For the factor analysis, we used a principal components method followed by varimax rotation to identify factors for each of the two sets of items. We performed the same type of analysis for the total group and for each of seven subgroups. In tables for this study's results, we identify institution types by abbreviations at the head of columns containing factor loadings for items listed at the left. Specifically, TOT refers to the total group, PUB to public colleges, PVT to private colleges, 4Y to 4-year colleges, 2Y to technical and 2-year colleges, LG to large colleges and SM to small colleges, and NET for the network of colleges.

Items assessing perceptions of both *Progress* and *Growth* sections are based on 5-point one-dimensional scales, where the five options in both sections are *very much*, *much*, *moderate (average)*, *little*, and *none*. In the analyses of each of the two sections, we assigned the following values: 5=*very much*, 4=*much*, 3=*moderate (average)*, 2=*little*, and 1=*none*. Although the *Growth* section of the survey has a sixth option, *not a goal of mine*, we converted any responses to that option to the value of the previous column, *none*, with the value of 1. In our discussions of these 5-point scales, we use the word *moderate* to refer to *moderate (average)*.

Number of records analyzed for the Progress section. In preparation for analysis of each section, we eliminated records with inadequate numbers of valid responses in the section. In the analysis of the 26 items—the *Progress* section, we eliminated records in which more than 17 of the 26 possible responses in

that section were *missing* (i.e., if fewer than 9 items had valid responses). We eliminated records in which responses to all of the 13 items in the second column were *missing*. Altogether for analysis of the *Progress* section, we retained a usable total of 66,128 of the 68,650 records, a decrease of 2,522 records.

Number of records analyzed for the Growth section. In the analysis of the 36 items—the *Growth* section, we eliminated records that contained responses of *not a goal of mine* for more than 30 of the 36 items. For remaining records containing any *not a goal of mine* responses, we assigned to those responses the value of a *none* response. We eliminated records that contained more than 20 *missing*. We eliminated records with more than 17 of the 18 responses in the second column *missing*. Finally, we retained only those records that had valid responses to at least 12 of the 36 items. Using these screening procedures, we retained 64,061 of the 68,650 records for analysis of the *Growth* section, a decrease of 4,589 records.

Means substitution. For both sections, we substituted item means for the remaining missing values because full-rank matrices were required for the analyses. We considered multiple imputation procedures, but because less than 1% of the data was missing, we decided to use simple means substitution. Given the number of missing values, this procedure likely had little impact on the results of the study.

Factor analyses. To explore both sections of outcomes items in the COS and to do so for each subgroup, we ran separate factor analyses—one for the 26 items in the *Progress* section and one for the 36 items in the *Growth* section. In the Results section factors for the *Progress* study appear in Tables 1 through 4; factors for the *Growth* study appear in Tables 5-8.

Factor means. The factor means were calculated as averages of the means of items with factor loadings at or above the factor loading cutoff point of .50. A summary of factor means for the total group and for each institution type appear in Table 9. Factor means and standard deviations for the total group and for public and private college groups appear in Tables 10, 11, and 12.

We used a minimum eigenvalue of 1 (MINEIGEN=1) and a factor loading of .50 in order for them to be assigned to factors. Furthermore, with few exceptions, items in a given section were assigned almost exclusively to no more than one factor. For convenience in preparing the tables, we multiplied the factor loadings by 100 to eliminate the decimal point.

Results

Each of the initial principal component analyses yielded four factors. For the total group of respondents in the *Progress* study, the first of these unrotated factors had an eigenvalue of 11.51 and accounted for 44.3% of the variance in the model. Similarly, for the total group of respondents for the *Growth* study, the

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first of these unrotated factors had an eigenvalue of 17.05 and accounted for 47.4% of the variance in the model.

After the orthogonal (varimax) rotation of the initial principal components (factors), the eigenvalues for the four factors identified in the *Progress* section were 5.19, 4.47, 3.31, and 2.80 and accounted for 60.6% of the variance; the eigenvalues for the four factors identified in the *Growth* section were 7.73, 4.98, 4.92, and 4.09 and accounted for 60.3% of the variance. All but one of the 26 *Progress* items, Item 10, *Further developing my study skills*, had a loading of at least .50 on one or more of the factors. All but four of the 36 *Growth* items had a loading of at least .50 on one or more of the factors. These four items were Item 7, *Actively participating in volunteer work to support worthwhile causes*; Item 21, *Learning how to manage finances (personal, family, or business)*; Item 23, *Developing moral principles to guide my actions and decisions*; and Item 35, *Becoming a more effective member in a multicultural society*.

Factor names. We developed descriptions for each of the factors we observed based on the variables that loaded most highly on the factor. The names we have applied to each factor may be debated as to their accuracy in describing the factor content, but we have examined the content and tried to select useful descriptions. The names are intended merely as handles by which we can refer to groups of items that appear to represent a single concept (or construct). The names of factors in the *Progress* section are *General Education and Skills*, *Critical Thinking, Science, Mathematics, and Technology*, and *Career Preparation*. The names of factors in the *Growth* section are *Academic and Whole Person Development*, *Social Interaction Skills*, *Political & Societal Awareness*, and *Personal and Spiritual Values*.

Items with factor loadings of .50 or higher on at least one factor for at least one type of institution are listed by institution type in tables 1 through 8. Loadings of .50 or higher by institution type are listed first for each factor. For the total group, both the items and their loadings that are not included in the factor appear shaded. For institution types, loadings that are not included for that institution type appear shaded. In Tables 1, 2, 5, and 8, some items fell below the .50 cutoff for the total group and for some, but not all, subgroups. For example, in Table 1, the total group's *General Education and Skills* factor consisted of the first 12 items, the last of which was Item 5, *Thinking objectively about beliefs, attitudes, and values*, with a factor loading of .51. However, public colleges included the same 12 items in their *General Education and Skills* factor, plus Item 10, *Further developing my study skills*. Private colleges, on the other hand, included only four items in their *General Education and Skills* factor—four to which all other groups assigned their highest loadings in *General Education and Skills*. To conclude the example, the unshaded factor loadings below a subgroup's column header identify items included in that subgroup's *General Education and Skills* factor. This same procedure of identifying items that belong in a given subgroup's factor applies to each of the first eight tables.

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In general, items with the highest loadings on a given factor were the same across all institution types, even though the size of the loadings varied modestly by type. Differences by institution type emerged only for items with low factor loadings, relative to the loadings of other items for that factor. While factor structures by institution type were not identical, there were few differences, the major one being that for private colleges with respect to the factors, *General Education and Skills* and *Critical Thinking*.

Four Factors from the *Progress* Section

General Education and Skills. As shown in Table 1, the *General Education and Skills* factor from the analysis of the 26 items in the *Progress* section points to an appreciation of cultural phenomena and the development of life skills that may enhance the enjoyment and the benefits of such things. For the total group, the two items with the highest loadings on the *General Education and Skills* factor were Item 16, *Appreciating the fine arts, music, literature, and the humanities* (68) and Item 18, *Discovering productive and rewarding uses of my talents and leisure time* (67). Each subgroup of institutions also had their highest *General Education and Skills* factor loadings on these same two items.

Critical Thinking. Several items that loaded on the *General Education and Skills* factor for public colleges did not load on that factor for private colleges. Instead, for private colleges, the skills items loaded on their *Critical Thinking* factor. This is the major difference in the factor patterns for the entire study.

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Table 1

Section IIA—Progress with Cognitive Skills
Factor 1—General Education and Skills

COS Section IIA – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
16. Appreciating the fine arts, music, literature, and the humanities	68	66	69	67	67	67	68	68
18. Discovering productive and rewarding uses of my talents and leisure time	67	66	68	68	65	68	67	67
8. Reading with greater speed & better comprehension	62	64	47	60	65	61	62	63
17. Broadening my intellectual interests	62	62	57	61	59	61	61	64
19. Learning principles for improving physical & mental health	60	60	57	62	56	61	60	58
13. Developing openness to new ideas and practices	56	58	45	55	50	53	54	56
12. Learning to formulate and re-shape my lifetime goals	56	58	46	55	52	55	54	54
6. Developing my creativity, generating original ideas and products	55	56	48	53	54	52	55	58
7. Improving my writing skill	54	57	40	50	61	50	57	56
9. Speaking more effectively	54	57	39	50	60	50	56	54
11. Listening to and understanding what others say	53	56	39	52	50	51	51	54
5. Thinking objectively about beliefs, attitudes, & values	51	54	36	49	47	47	49	53
10. Further developing my study skills	48	50	33	46	50	48	47	48
23. Learning principles for conserving and improving the global environment	49	48	47	49	52	50	50	49

Note. Values are multiplied by 100 and rounded to nearest integer. Values in shaded areas fell below the factor loading cutoff of 50.

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Table 2
Section IIA—Progress with Cognitive Skills
Factor 2—Critical Thinking

COS Section IIA – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
3. Learning to think and reason	76	75	77	76	77	76	77	76
2. Developing my problem-solving skills	75	75	73	75	76	75	75	75
1. Drawing conclusions after weighing evidence, facts, and ideas	74	74	73	74	74	74	75	73
4. Locating, screening, and organizing information	64	63	68	65	66	65	65	60
5. Thinking objectively about beliefs, attitudes, and values	55	52	65	56	58	57	56	51
11. Listening to and understanding what others say	52	49	63	54	55	53	54	49
13. Developing openness to new ideas and practices	47	44	58	48	51	49	49	44
9. Speaking more effectively	40	36	57	44	38	42	42	30
7. Improving my writing skill	40	36	55	45	35	43	41	27
10. Further developing my study skills	42	38	55	43	45	41	45	34
6. Developing my creativity, generating original ideas and products	44	42	55	47	46	46	46	38
8. Reading with greater speed and better comprehension	36	32	53	39	36	37	38	27
12. Learning to formulate and re-shape my lifetime goals	37	34	50	39	43	38	41	32

Note. Values are multiplied by 100 and rounded to nearest integer. Values in shaded areas fell below the factor loading cutoff of 50.

Science, Mathematics, and Technology. The first four of the five items that loaded on the Science, Mathematics, and Technology factor were the same for all institution types (see Table 3). The fifth item, Item 24, *Effectively using technology (e.g., computers, high tech equipment)*, had loadings above .50 for all but 2-year colleges and the network of colleges, whose loadings were .43 and .48, respectively. The loadings for the first two items listed for this factor in Table 3 ranged from a low of .73 for public colleges to highs of .88 for 2-year colleges, .89 for small colleges, and .90 for 4-year colleges, large colleges, and the network of colleges.

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Table 3
Section IIA—Progress with Cognitive Skills
Factor 3—Science, Mathematics, and Technology

COS Section IIA – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
25. Learning about the role of science and technology in society	78	77	79	90	88	90	89	90
26. Understanding and applying math concepts and statistical reasoning	74	73	76	90	88	90	89	90
22. Drawing conclusions after weighing evidence, facts, and ideas	71	70	74	67	64	66	66	65
23. Locating, screening, and organizing information	63	63	64	60	58	58	60	55
24. Effectively using technology (e.g., computers, high-tech equipment)	53	52	55	57	43	54	51	48

Note. Values are multiplied by 100 and rounded to nearest integer. Values in shaded areas fell below the factor loading cutoff of 50.

Career Preparation. For all institution types, the same four items loaded on the *Career Preparation* factor. For private colleges, factor loadings were higher for the first two items in the factor (.76 and .72) than for the other two items (.57 and .54). Otherwise, loadings for all institution types were in the upper 60s or above.

Table 4
Section IIA—Progress with Cognitive Skills
Factor 4—Career Preparation

COS Section IIA – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
14. Acquiring knowledge and skills needed for a career	74	73	76	73	74	73	73	71
15. Becoming competent in my major	68	67	72	66	73	66	68	69
21. Learning about career options	68	69	57	68	69	70	69	72
20. Developing effective job-seeking skills (e.g., interviewing, resume construction)	65	66	54	66	66	67	66	72

Note. Values are multiplied by 100 and rounded to nearest integer.

Four Factors from the *Growth* Section

Academic and Whole Person Skills. As shown in Table 5, the *Academic and Whole Person Skills* factor for the total group consisted of 15 items with factor loadings ranging from .50 to .72. All types of institutions had loadings higher than .70 on Item 25, *Becoming academically competent.* All institution types had loadings from .63 to .72 for the first seven items in the factor; the first 13 items had loadings above the cutoff of .50. Private colleges, 2-year and 4-year colleges, and small colleges had item loadings above .50 on Item 23, *Developing moral principles to guide my actions and decisions*; all types except large colleges and the network had loadings at .50 or higher on Item 19, *Clarifying my personal values.*

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Table 5
Section IID—Perceptions of Growth
Factor 1—Academic and Whole Person Skills

COS Section IID – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
25. Becoming academically competent	72	72	72	71	72	71	72	67
27. Increasing my intellectual curiosity	70	71	69	69	72	70	71	67
28. Setting long-term or "life" goals	69	68	70	68	70	66	70	68
31. Developing self-confidence	68	68	69	68	70	65	70	67
30. Understanding myself, my talents, and my interests	68	67	69	68	67	66	68	64
32. Becoming more willing to change and learn new things	66	66	67	65	68	63	68	64
36. Acquiring a well-rounded General Education	66	66	67	64	70	64	68	63
34. Improving my ability to stay with projects until they are finished	63	61	65	63	62	60	65	58
29. Constructively expressing both emotions and ideas	61	59	64	61	61	58	63	59
26. Developing productive work relationships with both men and women	61	59	63	62	59	57	62	56
20. Developing a sense of purpose, value, and meaning for my life	59	58	61	60	59	57	60	58
24. Acquiring appropriate social skills for use in various situations	59	57	62	60	58	55	61	55
22. Dealing fairly with a wide range of people	54	52	58	55	53	50	56	51
23. Developing moral principles to guide my actions and decisions	50	48	54	51	50	46	52	47
19. Clarifying my personal values	51	50	53	52	50	49	52	48
21. Learning how to manage finances (personal, family, or business)	46	43	51	48	43	43	48	41

Note. Values are multiplied by 100 and rounded to nearest integer. Values in shaded areas fell below the factor loading cutoff of 50.

Social Interaction Skills. Table 6 shows the seven items with loadings above the cutoff of .50 for all institution types. The loadings were very nearly the same by institution type. In order of the size of the loading, the seven items for this factor were: Item 1, *Becoming an effective team member*; Item 4, *Improving my ability to relate to others*; Item 2, *Becoming more willing to consider opposing points of view,*

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Table 6
Section IID—Perceptions of Growth
Factor 2—Social Interaction Skills

COS Section IID – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
1. Becoming an effective team or group member	70	71	69	69	72	70	70	72
4. Improving my ability to relate to others	68	68	69	68	69	69	68	66
2. Becoming more willing to consider opposing points of view	66	65	67	65	67	65	66	62
6. Developing leadership skills	63	63	64	63	64	63	64	65
3. Interacting well with people from cultures other than my own	63	63	62	63	62	63	62	62
8. Learning to be adaptable, tolerant, and willing to negotiate	60	61	59	60	61	61	60	60
5. Preparing to cope with changes as they occur (e.g., in career, relationships, lifestyle)	59	59	60	58	61	57	60	58

Note. Values are multiplied by 100 and rounded to nearest integer.

Item 6, *Developing leadership skills*; Item 3, *Interacting will with people from cultures other than my own*; Item 8, *Learning to be adaptable, tolerant, and willing to negotiate*; and Item 5, *Preparing to cope with changes as they occur (e.g., in career, relationships, lifestyle.*

Political and Societal Awareness. In Table 7, we see a similar degree of unanimity in that with one exception on the last item for private colleges, the same seven items for all institution types loaded on the *Political and Societal Awareness* factor. All institution types had factor loadings of .70 or above for the first three items—Item 12, *Becoming more aware of local and national political and social issues*, Item 11, *Preparing myself to participate effectively in the electoral process*, and Item 10, *Becoming more aware of global and international issues/events.*

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Table 7
Section IID—Perceptions of Personal Growth
Factor 3—Political & Societal Awareness

COS Section IID – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
12. Becoming more aware of local and national political and social issues	81	81	82	81	82	79	82	80
11. Preparing myself to participate effectively in the electoral process	77	76	78	76	79	74	79	75
10. Becoming more aware of global and international issues/events	72	72	73	71	74	70	74	71
13. Gaining insight into human nature through the study of literature, history, and the arts	70	72	64	68	74	69	71	69
14. Recognizing my rights, responsibilities, and privileges as a citizen	63	63	65	64	61	63	63	63
15. Becoming sensitive to moral injustices and ways of avoiding or correcting them	58	59	55	58	57	60	57	58
16. Understanding religious values that differ from my own	53	56	45	50	57	54	53	52

Note. Values are multiplied by 100 and rounded to nearest integer. The value in the shaded area fell below the factor loading cutoff of 50.

Personal and Spiritual Values. Table 8 shows the items and item loadings for the *Personal and Spiritual Values* factor. The first four items were the same for all institution types and the loadings for each item were similar. The next item loaded on the factor for all except private colleges and 4-year colleges. The remaining three items were not all included in the factors for public, large, or small colleges or the network of colleges: Only for 2-year colleges was the factor loading for Item 21, *Learning how to manage finances (personal, family, or business)*, high enough to be included. Unlike other types of institutions, private colleges and 4-year colleges had loadings at or above the cutoff (.56 and .50, respectively) for Item 16, *Understanding religious values that differ from my own.* Private colleges also had a loading above the cutoff for Item 9, *Seeking and conveying the spirit of truth.*

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Table 8
Section IID—Perceptions of Personal Growth
Factor 4—Personal and Spiritual Values

COS Section IID – Items by Number	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
33. Developing my religious values	67	66	70	69	63	67	66	67
18. Learning how to become a more responsible family member	64	65	61	61	67	63	64	63
23. Developing moral principles to guide my actions and decisions	57	58	56	57	57	59	56	59
19. Clarifying my personal values	52	53	50	51	54	53	52	54
17. Taking responsibility for my own behavior	51	53	49	48	56	51	53	53
16. Understanding religious values that differ from my own	48	45	56	50	47	46	49	47
9. Seeking and conveying the spirit of truth	46	44	53	48	42	44	46	47
21. Learning how to manage finances (personal, family, or business)	43	49	26	36	54	48	41	45

Note. Values are multiplied by 100 and rounded to nearest integer. Values in shaded areas fell below the factor loading cutoff of 50.

Factor Means

Factor means for each of the eight factors are presented in Table 9. Factor means, the number, and standard deviations for the total group, for public colleges, and for private colleges are presented in Tables 10, 11, and 12. Each factor mean represents a simple average of item means included in that factor, i.e., those items with factor loadings of .50 or above. The items for each factor tended to be the same across institution types, but only two factors contained the same items for all institution types—*Career Preparation* (4 items) *and Social Interaction Skills* (7 items).

Two additional factors contained the same items for all institution types with two exceptions. First, the item with the lowest loading on *Science, Mathematics, and Technology* was excluded from that factor by 2-year colleges and the network of colleges (see Table 3). Second, the item with the lowest loading on *Political and Societal Awareness* was excluded from that factor by private colleges (see Table 7).

In the remaining factors, all the items with the highest loadings on the factor were identical for all institution types. Among items with lower loadings, the only major exception to this pattern was that for items that other institution types loaded on the *General Education and Skills* factor, private colleges loaded onto the *Critical Thinking* factor.

For the total group, the factor with the highest factor mean in the *Progress* section was *Critical Thinking* (3.79). Comparisons of factor means by institution type can only be done with caution for this factor, because private colleges had 13 items that loaded on this factor while public colleges only had five items

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that loaded on it. (See Table 9 for factor means; see Tables 2, 10, and 12 for descriptions of the *Critical Thinking* factor and comparisons of private colleges with other types of colleges.)

The factor in the *Progress* section with the total group's lowest mean was *Science, Mathematics, and Technology* (3.29). The first four items that loaded on this factor were the same. The fifth item, Item 24, *Effectively using technology (e.g., computers, high tech equipment)*, had item loading cutoffs for 2-year colleges and the network just below the .50 cutoff—.43 and .48, respectively (see Table 3). The factor means by institution type, although not based on identical items, ranged from lows of 3.22 for 2-year and 3.23 for large colleges to 3.33 for the network of colleges. (See Table 9 for factor means; see Table 3 for items that loaded on the factor.)

For the total group in the *Growth* section, the factor with the highest mean was *Academic and Whole Person Skills* (3.89). The factor for the total group consisted of 15 items with only slight variations by institution type in either the size of the loading or in the factor mean. The last three of the 15 items were not included in the factor means of two or three of the institution types; a sixteenth item was included in the factor mean for only one type—private colleges (see Table 5). By institution type, the factor mean ranged from lows of 3.84 for 2-year colleges and 3.83 for the network of colleges to highs of 3.92 for 4-year colleges and 3.94 for private colleges.

In the *Growth* section for the total group, the lowest factor mean was for *Political and Societal Awareness* (3.34). The seven items included in this mean were identical except for the last one, *Understanding religious values that differ from my own*, which was excluded from the factor by private colleges by the .50 cutoff (see Table 7). By institution type, the factor means ranged from 3.21 to 3.43.

Table 9

Factor Means by Type of Institution

Eight Factors	Unstandardized Factor Loadings by Type of Institution							
	TOT	PUB	PVT	4Y	2Y	LG	SM	NET
From the COS Section IIA –Progress								
F1 — General Education and Skills	3.54	3.51	3.44	3.53	3.46	3.42	3.51	3.41
F2 — Critical Thinking	3.79	3.77	3.74	3.81	3.73	3.78	3.80	3.69
F3 — Science, Mathematics, and Technology	3.29	3.29	3.28	3.28	3.22	3.23	3.33	3.13
F4 — Career Preparation	3.65	3.63	3.68	3.64	3.67	3.57	3.71	3.55
From the COS Section IID – Growth								
F1 — Academic and Whole Person Skills	3.89	3.88	3.94	3.92	3.84	3.89	3.90	3.83
F2 — Social Interaction Skills	3.83	3.80	3.91	3.87	3.76	3.82	3.84	3.75
F3 — Political & Societal Awareness	3.34	3.29	3.43	3.38	3.24	3.30	3.37	3.21
F4 — Personal and Spiritual Values	3.74	3.70	3.75	3.63	3.68	3.68	3.78	3.64

Note. The configuration of items that define a factor may vary from group to group. The unshaded portions of Tables 1 to 8 indicate which items are included in the definition of each subgroup's factors and its factor mean.

Table 10

Factor Means For the Total Group of Colleges

	N	Mean	Std Dev
Perceptions of Progress–COS Section II A			
F1 – General Education and Skills Items A16, A18, A17, A8, A19, A13, A12, A6, A7, A9, A11, A5	66,128	3.54	0.73
F2 – Critical Thinking Items A3, A2, A1, A4, A5, A11	66,128	3.79	0.70
F3 – Science, Mathematics, and Technology Items A25, A26, A22, A23, A24	66,128	3.29	0.84
F4 – Career Preparation Items A14, A15, A21, A20	66,128	3.65	0.82
Perceptions of Growth–COS Section II D			
F1 – Academic and Whole Person Skills Items D25, D27, D28, D31, D30, D32, D36, D34, D29, D26, D20, D24, D22, D23, D19	64,061	3.89	0.74
F2 – Social Interaction Skills Items D1, D4, D2, D6, D3, D8, D5	64,061	3.83	0.72
F3 – Political & Societal Awareness Items D12, D11, D10, D13, D14, D15, D16	64,061	3.34	0.91
F4 – Personal and Spiritual Values Items D33, D18, D23, D19, D17	64,061	3.74	0.87

Note. The A or D preceding each item number refers to COS Section IIA or Section IID.

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Table 11
Factor Means For Public Colleges

	N	Mean	Std Dev
Perceptions of Progress–COS Section II A			
F1 – General Education and Skills Items A16, A18, A17, A8, A19, A13, A12, A6, A7, A9, A11, A5, A10	48,493	3.51	0.73
F2 – Critical Thinking Items A3, A2, A1, A4, A5	48,493	3.77	0.71
F3 – Science, Mathematics, and Technology Items A25, A26, A22, A23, A24	48,493	3.29	0.83
F4 – Career Preparation Items A14, A15, A21, A20	48,493	3.63	0.82
Perceptions of Growth–COS Section II D			
F1 – Academic and Whole Person Skills Items D25, D27, D28, D31, D30, D32, D36, D34, D29, D26, D20, D24, D22, D19	46,730	3.88	0.74
F2 – Social Interaction Skills Items D1, D4, D2, D6, D3, D8, D5	46,730	3.80	0.73
F3 – Political & Societal Awareness Items D12, D11, D10, D13, D14, D15, D16	46,730	3.29	0.91
F4 – Personal and Spiritual Values Items D33, D18, D23, D19, D17	46,730	3.70	0.88

Note. The A or D preceding each item number refers to COS Section IIA or Section IID.

Table 12
Factor Means For Private Colleges

	N	Mean	Std Dev
Perceptions of Progress–COS Section II A			
F1 – General Education and Skills Items A16, A18, A17, A19	17,635	3.44	0.86
F2 – Critical Thinking Items A3, A2, A1, A4, A5, A11, A13, A9, A7, A10, A6, A8, A12	17,635	3.74	0.69
F3 – Science, Mathematics, and Technology Items A25, A26, A22, A23, A24	17,635	3.28	0.86
F4 – Career Preparation Items A14, A15, A21, A20	17,635	3.68	0.81
Perceptions of Growth–COS Section II D			
F1 – Academic and Whole Person Skills Items D25, D27, D28, D31, D30, D32, D36, D34, D29, D26, D20, D24, D22, D23, D19, D21	17,331	3.94	0.72
F2 – Social Interaction Skills Items D1, D4, D2, D6, D3, D8, D5	17,331	3.91	0.70
F3 – Political & Societal Awareness Items D12, D11, D10, D13, D14, D15	17,331	3.43	0.91
F4 – Personal and Spiritual Values Items D33, D18, D23, D19, D16, D9	17,331	3.75	0.84

Note. The A or D preceding each item number refers to COS Section IIA or Section IID.

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Discussion

Summary of Findings

Using factor analysis, we identified four factors underlying the COS Section IIA-*Progress* scale (of 26 items)—*General Education and Skills*; *Critical Thinking;* *Science, Mathematics, and Technology*; and *Career Preparation*. We also identified four factors underlying the COS Section IID-*Growth* scale of 36 items—*Academic and Whole Person Skills*, *Social Interaction Skills*, *Political and Societal Awareness*, and *Personal and Spiritual Values*. In each instance, the factors identified were similar across all institution types in as much as items with the highest factor loadings for the total group were also those with the highest loadings for each institution type. The major exception occurred among items with lower loadings on the *General Education and Skills* factor in that some of the skill-related items associated by public college respondents with this factor were instead associated by private college respondents with the *Critical Thinking* factor. Even so, the items with the highest factor loadings for these two factors were identical for all institution types, including both public and private college respondents. The only other discrepancies of this kind that occurred on factors were among items with loadings near the .50 cutoff. The consistency of factor loadings across institution types suggests that these factors have broad applicability. We calculated factor means for each institution type.

Caveats

The cutoff point of .50 for item loadings was not entirely arbitrary, but as with any cutoff, the argument could be made for placing it at some other point. Several items with loadings between .40 and .49 could have been considered when labeling the factors we identified. Would adding these items to the factors on which they loaded have changed the nature of the factor? Probably not, but a local user might have reason to include more of the items than we included in constructing the factors in this study.

Although the sample is very large, it is a user sample, not a nationally representative sample. Even though we made several adjustments to improve it, this does not change the basic fact that it consists of student records from institutions that have used the COS.

Furthermore, as with any factor analysis, the derived factors are constrained by the quality and appropriateness of the items that were factor analyzed. While the COS items were developed as a result of studies of the literature on college outcomes assessment, the factors identified in this study are limited by the content of the items analyzed.

Given the magnitude of the eigenvalues for the first unrotated factors of both the *Progress* section and the *Growth* section (accounting for 44.3% and 47.4% of the variance in the two analyses), one might

argue that *response set* or variations in the overall level of perceived progress/growth outweighed all of the findings. Nevertheless, despite the constraints, the rotated factor solutions yielded four factors that make sense intuitively and correspond well with findings from outcome studies reported in the literature.

Uses and Implications of the Factors

Given that the instrument we have chosen limits us to student perceptions of their college outcomes, are these areas appropriate for college administrators and policy makers to be concerned about? Are the factors we identified appropriate for colleges to use in assessing college outcomes? In their Carnegie Foundation report, Boyer and Levine (1981) used the analogy of a 3-room house to describe areas of responsibility for the undergraduate curriculum. Their first room is the academic major, the second is the electives area, and the third is general education. The COS instrument focuses more on the latter, even if it speaks to some extent to all three. At least one, and arguably several, of the factors identified in this study appear to be related to goals of general education. General education is one of the most important and most difficult charges of higher education. Many books, articles, and special commissions have been inspired by its challenge (Harvard College, 1945; President's Commission on Higher Education, 1947; Dressel & Mayhew, 1954; Rudolph, 1977, 1962; Boyer & Levine, 1981; Gaff, 1983, 1989; Weingartner, 1992).

General education is usually the responsibility of the entire institution, but too frequently, the responsibility is dispersed. The means—usually, the required general education courses—can easily be mistaken for the desired ends. With factors that focus on students' perceptions of the desired ends and on their actual progress and growth, colleges can learn whether means and ends are appropriately related to college outcomes. Although the instrument asks if students feel they have become competent in their major and if they have acquired knowledge and skills needed for a career, the responses to these questions remain in the realm of perceptions. The instrument asks students about the extent to which they have broadened their intellectual interests, increased their intellectual curiosity, and developed openness to new ideas, but again, the responses to these questions remain in the realm of perceptions. Nevertheless, a large and difficult portion of college outcomes have been addressed—those associated with the ends that most colleges hope to achieve. Using the analogy of higher education's 3-room house (Boyer & Levine, 1981), these college outcomes include, as the first room, a sense of competence in a major area—the faculty's domain; as the second room, a breadth of intellectual and personal interests—the student's domain; and as the third room, goals associated with general education—a domain claimed by no one but the responsibility of all.

Based on an examination of literature that analyzes the nature of assessment of college outcomes and the rationales for such assessment, we feel the factors identified in this study do indeed point to a

sizeable portion of desired college outcomes. The results also appear to match the major areas of growth and progress mentioned in the literature on outcomes of higher education. For example, Pascarella and Terenzini (1991) reviewed and synthesized 2,600 pieces of research on student characteristics likely to be affected by the college experience. A catalog of the college outcomes documented in the literature can be summarized by listing topics from the chapter titles of their 900-page book, *How College Affects Students* (1991), that outlines areas that parallel the areas of this study. Their book includes such topics as cognitive skills and intellectual growth; verbal, quantitative, and subject matter competence; identity, self-concept, and self-esteem; psycho-social changes; attitudes and values; moral development; educational attainment; career choice and development; economic benefits; and quality of life after college. Indeed, their book was useful in the development of the COS instrument because of its degree of thoroughness. Many of its topics appear in items of the progress and *growth* sections of the instrument we used, and many characteristics the authors found to be associated with how college affects students are included in the factors identified in the present study. Earlier studies have also been done to examine how college affects students. Feldman and Newcomb (1969) looked for and found similar college outcomes by examining 1,500 studies conducted over a period of 40 years.

One caveat that Pascarella and Terinzini (1991) offered in their book was that many of the studies they examined were conducted in 4-year colleges. The current study addresses their concern by examining perceived outcomes across several institution types, including 2-year colleges.

Astin (1973) has referred to need for a taxonomy that includes both cognitive and affective dimensions—the whole person. He and other members of the Study Group on the Conditions of Excellence in American Higher Education issued an influential final report, *Involvement in Learning: Realizing the Potential of American Higher Education* (Mortimer, et al., 1984), sharing with the education community the study group's insights. The report addresses the need for students to do more than acquire knowledge; they must acquire other character traits as well. For example, in their first chapter, they state, "The United States must become a nation of educated people. Its citizens must be knowledgeable, creative, and open to ideas. Above all, they should learn how to learn so they can pursue knowledge throughout their lives and assist their children in the same quest" (p. 2). On numerous occasions, Astin has emphasized that the college experience should make a positive difference to students, not only in their knowledge and skills, but also in affective areas such as attitudes (1985, 1984, 1975, & 1973). Astin has long been an advocate of student surveys and self-reports (1991).

In the introduction of *Assessing Educational Outcomes*, Ewell (1985) stated that there are many different typologies of student outcomes, but that all of them make a number of distinctions--three major ones. First is the distinction between cognitive and affective outcomes, i.e., we need to distinguish between

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gains in knowledge and changes in attitudes or values. Second is the distinction between psychological and behavioral outcomes, i.e., we need to distinguish between "changes occurring inside a student's head and changes that can be observed directly during and after college" (p. 3). Third is the distinction between within-college and after-college outcomes, i.e., we need to distinguish when the outcome occurs. In this study, we have tried to address such distinctions. The factors and the items contained in each factor can help colleges to make such distinctions as they engage in outcomes assessment. Regarding the last distinction, we did not take full advantage of the COS instrument to distinguish between contributions of the college versus growth that occurred outside the institution. Nevertheless, the sections we did use are preceded by instructions to the student in the *Progress* section to indicate "progress made **at this college** toward attainment of that outcome." Instructions in the *Growth* section asks students to indicate "the extent of our **growth** since entering this college (regardless of the extent of the contribution made by your experiences at this college." Students are instructed to use the *Growth* section a second time to indicate the extent of the *college contribution to their growth.* However, we did not include responses from the college contribution scale in our study. Our study does, however, address the first two distinctions that Ewell described as important in assessments of college outcomes.

Howard Bowen (1977) reviewed close to 600 studies of college outcomes to see if colleges are worth what they cost. He identified outcomes and benefits that accrue to those who attend college—intellectual, personal, and economic benefits. Many of the intellectual and personal dimensions he identified parallel those of the current study. He concluded that, "Education should be directed toward the growth of the whole person through the cultivation not only of the intellect and of practical competence but also of the affective dispositions, including the moral, religious, emotional, social, and esthetic aspects of the personality. No theme runs more consistently through the goal literature." (p. 33). K. Patricia Cross (1986) concurred with Bowen's conclusion, adding that this "widely accepted goal is what makes the assessment of higher education so difficult" (p. 11).

The findings of the current study appear to be in line with much of the literature on college outcomes, even that of Bowen's conclusion about the "whole person." Factors such as those identified in this study can be useful to individual institutions as they move toward defining and assessing appropriate college outcomes.

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